Associations between Community Nutrition Environments and Early Care and Education Barriers to Classroom Nutrition Practices.

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Overview.

- Background & Study Purpose
  - Early Childhood Education
  - Community Impact on Nutrition
  - Specific Aims & Hypotheses

- Survey and Measures

- Study Findings

- Conclusions
The early childhood years are formative and essential for developing preferences and behaviors.\(^1\)

Child behavior is influenced by practices and attitudes of primary caregivers, including those involved in their daily out-of-home care.\(^2\)

Therefore, settings for early childhood education (ECEs) are ideal for promoting health-related patterns (i.e., physical activity and nutrition).
ECE Classroom Best Practices.

**Nutrition**

- Offering fruits, vegetables, and lean proteins.
- Encouraging children to try new or less preferred foods.
- Serving meals family style.

Gubbels et al., 2010
Pate et al., 2004.

#SNEB2021: Raising Reliance and Resilience
ECE Classroom Best Practices.

**Nutrition**
- Offering fruits, vegetables, and lean proteins.
- Encouraging children to try new or less preferred foods.
- Serving meals family style.

**Challenges Ahead**

**Financial concerns.**

**Children’s preferences.**

**Concern for food waste.**

Dev et al., 2017. #SNEB2021: Raising Reliance and Resilience
Lack of access to healthy food outlets, and higher density of fast food outlets, is related lower-quality diets in all age groups.¹

Healthfulness of food outlets surrounding schools impacts diets of older children.²

1. Drewnowski et al., 2004.
Determine associations between community nutrition environments and ECE barriers to classroom nutrition practices, by ECE context [Head Starts, community-based childcare (CBCs), and family child care homes (FCCHs)]. We hypothesized that community access to healthy environments will influence type of perceived barriers to implementing classroom nutrition practices.
Statewide Survey: “COMMUNITIES & CLASSROOM HEALTH”.

- Statewide survey including directors of licensed childcare settings in Oklahoma that serve children 3 to 5 years old.

- Data collection November 2019 to February 2020.
  - Mailed surveys
  - Email distribution of online survey link
  - Phone call follow-ups for non-respondents

- Collected information on center location and characteristics, and classroom health practices and barriers.
Community Nutrition Environments.

- Geocoded locations of **grocery stores** in Oklahoma using ArcMap 10.6
- Location determined by in-person audit conducted in 2016

**“Food Desert”**¹

No grocery stores within specified radius of ECEs
- 0.25 mile for Urban sites
- 10 miles for Rural sites

¹ Moore et al., 2006.
Barriers to Classroom Nutrition Practices

- Items derived from previous statewide survey
  - Reported (Y/N) whether the ECE experienced specific barriers to:
    1. Serving healthful foods and beverages
      - Including fruits/vegetables as snacks
      - Serve no juice
      - Not enough money to cover costs
      - Lack of control over meals
    2. Implementing mealtime best practices
      - Serving meals family style
      - Talking with children about foods
      - Children make too much of a mess
      - Lack of time and/or staff

Statistical Analysis.

- Means, frequencies, variable re-coding and primary analyses performed in SAS 9.4

- Non-parametric methods were used for all analyses
  - Fisher’s Exact test for difference in prevalence of reporting barriers across categories:
    - ECE context
    - Food Desert status

- Level of significance were adjusted for multiple comparison ($p<0.004$)
Results: Final Sample.

- **Head Start centers (n=54)**
  - Had the highest percent of teachers with a Bachelor’s degree or higher
  - Had the highest number of supporting staff (non-teachers)

- **Community-Based Childcare (n=159)**
  - Served the highest number of total children
  - Had the lowest percent of serving children on SNAP or WIC

- **Family Child Care Homes (n=160)**
  - Had the lowest number of staff and children
  - Were mostly participating in CACFP (88.0%)
Results: ECEs and Food Desert Status.

24.0% Head Starts, 27.6% CBCs, & 36.8% FCCHs are located in a “Food Desert”
<table>
<thead>
<tr>
<th>Professional Program Participation [n (%)]</th>
<th>Head Start (n=51)</th>
<th>CBC (n=155)</th>
<th>FCCH (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACFP</td>
<td>53 (98.5)</td>
<td>99 (62.2)</td>
<td>142 (88.7)</td>
</tr>
<tr>
<td>Go NAP SACC</td>
<td>4 (7.4)</td>
<td>6 (3.7)</td>
<td>3 (1.8)</td>
</tr>
<tr>
<td>Certified Early Childhood</td>
<td>11 (20.3)</td>
<td>19 (11.9)</td>
<td>10 (6.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Methods for Purchasing Center Foods [n (%)]</th>
<th>Head Start (n=51)</th>
<th>CBC (n=155)</th>
<th>FCCH (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-person shopping at a store</td>
<td>7 (13.2)</td>
<td>53 (33.9)</td>
<td>124 (77.5)</td>
</tr>
<tr>
<td>Online ordered then picked up in-person</td>
<td>1 (1.8)</td>
<td>38 (24.3)</td>
<td>27 (16.8)</td>
</tr>
<tr>
<td>Online and delivered</td>
<td>23 (43.4)</td>
<td>44 (28.2)</td>
<td>8 (5.0)</td>
</tr>
<tr>
<td>Over the phone with a vendor</td>
<td>22 (41.5)</td>
<td>21 (13.4)</td>
<td>1 (0.6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roundtrip Miles to Purchasing Center Foods (mean ± SD)</th>
<th>Head Start (n=51)</th>
<th>CBC (n=155)</th>
<th>FCCH (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11.6 ±13.7</td>
<td>15.5 ± 21.3</td>
<td>18.7 ± 22.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person Responsible for Center Meal Planning [n (%)]</th>
<th>Head Start (n=51)</th>
<th>CBC (n=155)</th>
<th>FCCH (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner/Director</td>
<td>5 (9.2)</td>
<td>65 (40.8)</td>
<td>152 (95.0)</td>
</tr>
<tr>
<td>Cook or Chef</td>
<td>18 (33.3)</td>
<td>81 (50.9)</td>
<td>5 (3.1)</td>
</tr>
<tr>
<td>Catering Company</td>
<td>2 (3.7)</td>
<td>1 (0.6)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Dietician</td>
<td>15 (27.7)</td>
<td>4 (2.5)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Located within a “Food Desert” [n (%)]</th>
<th>Head Start (n=51)</th>
<th>CBC (n=155)</th>
<th>FCCH (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13 (24.0)</td>
<td>44 (27.6)</td>
<td>59 (36.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance in Miles to Nearest Grocery Store (mean% ± SD)</th>
<th>Head Start (n=51)</th>
<th>CBC (n=155)</th>
<th>FCCH (n=159)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.2 ± 3.3</td>
<td>1.5 ± 2.6</td>
<td>2.3 ± 3.1</td>
</tr>
</tbody>
</table>

CBC= Community-Based Childcare; FCCH= Family Child Care Homes; CACFP= Child and Adult Care Food Program; NAPSACC= Nutrition and Physical Activity Self-Assessment for Child Care.
Barriers to Classroom Nutrition Practices...

...% by ECE Context.

- Lack of money: 37.7% in Head Starts, 28.1% in CBCs, 31.4% in FCCHs
- Lack of control: 31.4% in Head Starts, 14.7% in CBCs, 2.5% in FCCHs
- Concern for food waste: 40.5% in Head Starts, 14.8% in CBCs, 19.2% in FCCHs
- Too much mess: 40.6% in Head Starts, 30.1% in CBCs, 21.6% in FCCHs

...% by Food Desert Status, in FCCHs only.

- Concern for food waste: 55.1% in Food Desert, 32% in Non-Desert
- Limited storage space: 30.5% in Food Desert, 17% in Non-Desert
- Unsure of recommendations: 22% in Food Desert, 9% in Non-Desert
- Too much mess: 46.4% in Food Desert, 37.2% in Non-Desert

*Barriers did not vary by Food Desert status in Head Starts or CBCs.
Summary & Conclusions.

- This study is the **first** to examine how the surrounding community is related to ECE classroom health.

- For **FCCHs only**, location within a Food Desert was associated with reporting a **higher prevalence of barriers** to serving healthful food and beverages.
  - Head Starts and CBCs may be **protective** of the surrounding community environment, unlike schools or homes.
  - Future research and policy implementation should seek to understand how to provide **support** for **FCCHs residing in low-access areas**.

- Differences in how ECEs interact with their surrounding community **may be attributable to differences** in allotted resources for implementing health practices, food preparation methods, meal planning, and food purchasing.
  - Future studies should examine whether food prep/planning methods and more influence implementation of nutrition practices, across **ECE types**.
Acknowledgements.

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- **Community Partners:** Kay Floyd with the Office of Head Start Collaboration, Linda Whaley and additional partners with the Oklahoma Department of Human Services, Oklahoma State Department of Health, Oklahoma Association for the Education of Young Children, and Oklahoma Child Care Association.

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- **Student & Volunteer Research Team:** Daisy Butzer & Cassandra Camp.

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OUHSC Department of Nutritional Sciences
References.


QUESTIONS?
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Purpose

Describe FCCH menu quality by examining nutrients, variation in food served, and compliance with the Child and Adult Care Food Program.

Methods

- Happy Healthy Homes
- Family Child Care Home
- CACFP participation
- Care for at least one 2- to 5-year-old child
- Menu provided
  - One week analyzed
  - Breakfast, lunch, snack
  - Food Processor
  - Dietary Reference Intakes (2/3)
  - Variety of foods
- CACFP recommendation and best practice compliance

Developing Adventurous Eaters

- Critical time of development, optimal nutrition needed, avoid excess calories
- Establishing lifetime dietary patterns
- A time of picky eating and food neophobia
- Repeated food exposures necessary
- Large variety of food exposures

A Bio-ecological Approach

- Bronfenbrenner 1979
- Bronfenbrenner 1994
- Laughlin 2013
- Ritchie et al. 2012
- Jimenez et al. 2016
- Lehto et al. 2016
- Kroenke et al. 2013
- Andreyeva et al. 2018
- Garde et al. 2018
- Lee et al. 2018
- Larson et al. 2011
- Benjamin-Neelon et al. 2018
- Frampton et al. 2014
- Maalouf et al. 2013
- Sisson et al. 2020
- Kroeger et al. 2020

Acknowledgements

- Inspiring Mentors
- Excellent Colleagues
- Fantastic Graduate Students
- No Disclosures
Descriptive Characteristics of the FCCH Programs

- **n=49**
- **48.2 ± 14.2 years**
- **51.1%** White
- **9.0 ± 4.2 children in care**
- **18.8 ± 5.6 years in the business**
- **41.9% completed at least some college**
- **1.4 ± 4.2 staff**
- **10.8 ± 6.6 hours/day in meal prep**
- **91.9%** completed at least some college

FCCH Macronutrient Profiles

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Mean ± SD</th>
<th>95% CI</th>
<th>1-3 year DRI</th>
<th>Within 95% CI</th>
<th>4-8 year DRI</th>
<th>Within 95% CI</th>
<th>Within 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>640 ± 14</td>
<td>661-668</td>
<td>within 800-1067</td>
<td>insufficient</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein (g)</td>
<td>31.3 ± 0.9</td>
<td>29.6-33.1</td>
<td>exceeds 12.7</td>
<td>exceeds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbs (g)</td>
<td>90.5 ± 1.6</td>
<td>87.9-93.8</td>
<td>exceeds 86.7</td>
<td>exceeds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fat (%)</td>
<td>25.3 ± 0.7</td>
<td>24.0-26.6</td>
<td>30-40</td>
<td>insufficient 25-35 within</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fat (g)</td>
<td>18.3 ± 0.6</td>
<td>16.5-20.8</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sat fat (g)</td>
<td>7.1 ± 0.3</td>
<td>6.7-7.7</td>
<td>As low as possible</td>
<td>As low as possible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fiber (g)</td>
<td>7.3 ± 0.2</td>
<td>6.9-7.7</td>
<td>12.7</td>
<td>insufficient 16.7 insufficient</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FCCH Micronutrient Profiles

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Mean ± SD</th>
<th>95% CI</th>
<th>1-3 year DRI</th>
<th>Within 95% CI</th>
<th>4-8 year DRI</th>
<th>Within 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A (RAE mcg)</td>
<td>447.3 ± 12.2</td>
<td>422.7-471.9</td>
<td>exceeds 200</td>
<td>266.7 exceeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>36.0 ± 2.0</td>
<td>32.0-40.0</td>
<td>exceeds 10</td>
<td>16.7 exceeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D (IU)</td>
<td>219.1 ± 4.3</td>
<td>209.4-227.7</td>
<td>insufficient 400</td>
<td>insufficient 400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>707.9 ± 15.3</td>
<td>677.2 - 738.6</td>
<td>exceeds 466.7</td>
<td>exceeds 666.7 exceeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>4.5 ± 0.1</td>
<td>4.2 - 4.8</td>
<td>within 4.7</td>
<td>6.7 insufficient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>180.0 ± 27.3</td>
<td>151.9-205.0</td>
<td>exceeds 800</td>
<td>exceeds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>4.3 ± 0.2</td>
<td>4.0-4.7</td>
<td>exceeds 2.0</td>
<td>3.3 exceeds</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variety of Fruits, Vegetables, High Sugar and High Fat Foods

<table>
<thead>
<tr>
<th>Number of Different Foods</th>
<th>Fruit</th>
<th>Vegetable Food Categories</th>
<th>High Sugar</th>
<th>High Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7.1</td>
<td>5.5</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>2</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>3</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>4</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>5</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>6</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>7</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>8</td>
<td>3.8</td>
<td>2.8</td>
<td>0.9</td>
<td>3.8</td>
</tr>
</tbody>
</table>

CACFP Compliance

<table>
<thead>
<tr>
<th>Requirement Score (%)</th>
<th>Best Practice Score (%)</th>
<th>Total Score (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65.9</td>
<td>66.8</td>
<td>66.3</td>
</tr>
</tbody>
</table>

Discussion

- Menu quality is similar to previous reports
- Menu quality varies from foods served
- Most substitutions are of equal or higher nutrition quality
- Variety of produce is encouraging
- Increase information provided on menus

Thank you!

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